U.S. Department of Energy
Office of River Protection
P.O. Box 450
Richland, Washington 99352

01-OSR-0420

Mr. Ron F. Naventi, Project Manager
Bechtel National, Inc.
3000 George Washington Way
Richland, Washington 99352

Dear Mr. Naventi:

CONTRACT NO. DE-AC-01RV14136 - STANDARDS SELECTION PROCESS INSPECTION REPORT, IR-01-006

From September 10 - 13, 2001, the Office of Safety Regulation performed an inspection of the Bechtel National, Inc. (BNI) standards selection process. The purpose of this letter is to forward the results of the inspection.

The inspection team identified two Findings, documented in the Notice of Findings (Enclosure 1). Details of the inspection, including the Findings, are documented in the enclosed inspection report (Enclosure 2). The first Finding resulted from the Contractor's hazard database [i.e., the Standards Identification Process Database (SIPD)] not containing the information required by Appendix A of the Safety Requirements Document (SRD). Specifically, as of September 13, 2001, the database did not contain the rationale for the selection of preferred control strategies or estimates of the frequencies and consequences of mitigated events. The second Finding resulted from the process used to formally transmit SIPD design requirements from ES&H to Engineering not being performed in accordance with the controlling procedure (K70P557E). You are requested to provide a written response to these Findings within 30 days, in accordance with the instruction provided in the Notice of Findings.

It was evident at the time of this inspection that the design and design process had not evolved to the extent that would allow a complete evaluation of the design standards selection process. For example, there were no structures, systems, or components which had completed the design standards identification process. In addition, BNI had not completed the selection of design basis events (DBEs) or the selection of preferred control strategies for mitigating these DBEs. Since all work reviewed was considered to be "in process," only a limited review of the standards selection process could be performed. However, through interviews with BNI staff and review of procedures, calculations, and related documentation, the inspection team determined a process was in place that, when fully implemented, should provide assurance that the proper design standards for structures, systems, and components would be selected for identified design basis events.

If you have any questions regarding this inspection, please contact me or Pat Carier of my staff on (509) 376-3574. Nothing in this letter should be construed as changing the Contract, DE-AC27-01-RV14136. If in my capacity as the Safety Regulation Official, I provide any direction that your company believes exceeds my authority or constitutes a change to the Contract, you will immediately notify the Contracting Officer and request clarification prior to complying with the direction.

Sincerely,

Robert C. Barr
Safety Regulation Official
Office of Safety Regulation

OSR:RWG

Enclosures

cc w/encls:
W. R. Spezialetti, B

Enclosure 1
01-OSR-0420

NOTICE OF FINDINGS

Section C, "Statement of Work," Standard 7, "Environment, Safety, Quality, and Health," of Contract DE-AC27-01RV14136, dated December 11, 2000, between Bechtel National, Inc. (the Contractor) and the U.S. Department of Energy (DOE), defines the Contractor's responsibilities under the Contract as they relate to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and, quality assurance.

Standard 7, Section (d) of the Contract requires the Contractor to develop and implement an integrated, standards-based, safety management program to ensure that radiological, nuclear, and process safety requirements are defined, implemented, and maintained. The Contractor is required to conduct work in accordance with the Contractor developed and DOE approved Safety Requirements Document (SRD).

Standard 7, Section (e)(3), "Quality Assurance," of the Contract requires the Contractor to develop a Quality Assurance (QA) Program, supported by documentation that describes overall implementation of QA requirements. Documentation must identify the procedures, instructions, and manuals used to implement the Contractor's QA program within the Contractor's scope of work.

During performance of an inspection of the Standards Selection Process conducted September 10-13, 2001, at the Contractor's offices, the Office of Safety Regulation (OSR) identified the following:

1. The Contractor's Quality Assurance Manual, 24590-WTP-QAM-QA-01-001, "Quality Assurance Manual," Rev. 0, dated August 31, 2001, contains the policies which establish the QA requirements for the project. QAM Policy Q-05.1, "Instructions, Procedures, and Drawings," Section 3.1.1 states that "Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, and drawings of the type appropriate to the circumstances that include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished."

   Contrary to the above, during performance of the Standards Selection Process inspection, conducted September 10-13, 2001, the OSR identified that Environmental, Safety and Health (ES&H) did not formally transmit SIPD design requirements for use as required by procedure K70P557E, "Design Inputs, Rev. 2, dated August 24, 2001. During interviews with Engineering and ES&H personnel concerning how SIPD requirements were transmitted to Engineering, interviewees stated that the cognizant safety engineer inputted SIPD requirements directly onto the appropriate design input memorandum (DIM) table. The three Contractor staff interviewed stated that ES&H formally signed off on the SIPD requirements contained on the DIM as part of the Design Review Request (DRR) using form K70F507. While the process used by the Contractor may be adequate to control design inputs, the transmittal of SIPD design requirements from

ES&H to Engineering was not being performed in accordance with the controlling procedure (K70P557E).

This is considered an inspection Finding (See IR-01-006, Section 1.3, IR-01-006-01-FIN).

2. Appendix A, Section 5.0, "Development of Control Strategies," of the SRD requires the following information produced by the control strategy definition to be recorded in the hazard database:

   a. Rationale for preferred control strategy selection
   b. Estimate of the consequences from the mitigated event
   c. Estimate of the mitigated event frequency.

   Contrary to the above, as of September 13, 2001, the Contractor's hazard database [i.e., the Standards Identification Process Database (SIPD)] did not include a rationale for the selection of preferred control strategies, mitigated event frequencies, or mitigated event consequences (i.e., dose values). The SIPD database did not contain a field for entry of the rational for the selection of preferred control strategies.

   This is considered an inspection Finding (See IR-01-006, Section 1.5, IR-01-006-02-FIN).

The OSR requests that the Contractor provide, within 30 days of the date of the cover letter that transmitted this Notice, a reply to these Findings. The reply should include: (1) admission or denial of each alleged Finding, (2) the reason for each Finding, if admitted, and if denied, the reason why, (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further Findings, and (5) the date when full compliance with the applicable commitments in your authorization base will be achieved. Where good cause is shown, consideration will be given to extending the requested response time.

Enclosure 2
01-OSR-0420

U. S. DEPARTMENT OF ENERGY

Office of River Protection
Office of Safety Regulation

INSPECTION:	STANDARDS SELECTION PROCESS
REPORT NO.:	IR-01-006
FACILITY:	Bechtel National, Inc. (BNI)
LOCATION:	3000 George Washington Way Richland, Washington 99352
DATES:	September 10 – 13, 2001
INSPECTORS:	R. Griffith (Lead), Senior Regulatory Technical Advisor R. Gilbert, Senior Regulatory Technical Advisor N. Kaushal, Senior Regulatory Technical Advisor V. Ferrarini, OSR Consultant W. Sherbin, OSR Consultant
APPROVED BY:	P. Carier, Verification and Confirmation Official Office of Safety Regulation

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EXECUTIVE SUMMARY
Standards Selection Process
Inspection Report Number IR-01-006

INTRODUCTION

This inspection of the Bechtel National, Inc. (the Contractor) standards selection process covered the following specific areas:

- Standards Process Initiation (Section 1.2)
- Identification of Work (Section 1.3)
- Hazards Evaluation (Section 1.4)
- Development of Control Strategies (Section 1.5)
- Identification of Standards (Section 1.6)
- Confirmation of Standards (Section 1.7)
- Formal Documentation (Section 1.8)
- Recommendations (Section 1.9)

SIGNIFICANT OBSERVATION AND CONCLUSIONS

- Contractor staff assigned to the Process Management Team were capable of performing their oversight function for the establishment of radiological, nuclear, and process safety standards and requirements for the design, construction, and operation of the River Protection Project Waste Treatment Plant (RPP-WTP). (Section 1.2)

- The work activity experts supporting the Contractor's integrated safety management (ISM) process were qualified adequately. The Process Management Team was performing oversight of the ISM process adequately. The Contractor was acceptably controlling design inputs; however, a related failure to follow procedures was considered to be a Finding (IR-01-006-01-FIN). The Contractor was using appropriate design information in work identification meetings and was re-performing work identification, as necessary, as a result of design evolution. (Section 1.3)

- The program for the identification and evaluation of hazards was acceptable, adequately implemented, and procedurally compliant. Hazards evaluation methodologies used by the Contractor were consistent with the guidelines developed by the American Society of Chemical Engineers (AIChE). Preliminary accident analyses considered appropriate radiological release considerations and verified the severity levels determined during hazards analysis. (Section 1.4)

- The process for development of control strategies was generally consistent with the commitments in Appendices A and B of the SRD. The ISM process adequately implemented the SRD implementing criteria for defense-in-depth and single failure criteria; however, a Finding was identified for failure to comply with the SRD, Appendix

A commitments for documenting the rationale for the selection of preferred control strategies, mitigated event frequencies, and mitigated event consequences (i.e., dose values) in the Contractor's hazard database (IR-01-006-02-FIN). (Section 1.5)

- The standards selection process was iterative. Required linkages existed between the hazards, control strategies, and standards selected. Standards were selected to implement control strategies identified. (Section 1.6)

- Procedures had been implemented to ensure that the standards confirmation process was performed in accordance with SRD commitments. (Section 1.7)

- The inspectors were unable to review and come to conclusions regarding formal documentation of the standards selection process or Contractor certification of the recommended standards set due to the lack of completion of the standards selection process. (Sections 1.8 and 1.9)

STANDARDS SELECTION PROCESS INSPECTION, IR-01-006

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STANDARDS SELECTION PROCESS INSPECTION REPORT

1.0 REPORT DETAILS

1.1 Introduction

Standard 7, "Environment, Safety, Quality, and Health," of Contract DE-AC27-01RV14136, dated December 11, 2000, between Bechtel National, Inc. (the Contractor) and the U.S. Department of Energy (DOE), defines the Contractor's responsibilities under the Contract as they relate to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and, quality assurance. Standard 7, Section (d) of the Contract requires the Contractor to develop and implement an integrated, standards-based, safety management program to ensure that radiological, nuclear, and process safety requirements are defined, implemented, and maintained. DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor*, describes the process the Contract was to use to develop and recommend a set of radiological, nuclear, and process safety standards and requirements. Safety Requirements Document (SRD) Appendix A, "Implementing Standard for Safety Standards and Requirements Identification," describes the Contractor's commitment to implement an integrated safety management (ISM) process to establish the set of radiological, nuclear, and process safety standards and requirements.

The inspectors reviewed the Contractor's procedures associated with the standards selection process to determine if they complied with the commitments in the Contract and SRD. In addition, the inspectors assessed the implementation of these procedures as they related to the design phase of the River Protection Project Waste Treatment Plant (RPP-WTP) Contract to verify the Contractor was following its procedures and important-to-safety functions were being properly conducted.

1.2 Standards Process Initiation (Inspection Technical Procedure [ITP] I-105)

1.2.1 Inspection Scope

The inspectors reviewed position descriptions, resumes, and the Process Management Team (PMT) Charter to verify that the Contractor had assigned appropriate staff to the safety requirements and standards identification management team.

1.2.2 Observations and Assessments

SRD Volume II, Appendix A implemented the process for establishing a set of radiological, nuclear, and process safety requirements and standards as described in DOE/RL-96-0004 and RL/REG-98-17, *Office of Safety Regulation Position on Tailoring for Safety*. To assist the RPP-WTP Project Manager in assuring that the input information required for the safety standards and requirements identification process was collected and organized, the SRD required the

establishment of a Process Management Team (PMT) chaired by the Radiological, Nuclear, and Process Safety Manager. The SRD required the PMT to include managers from the following project organizations:

- Environmental, Safety and Health (ES&H)
- Engineering
- Operations

A review of the PMT Charter (contained in Meeting Minutes CCN 021520, Process Management Team 24th Meeting [ISM Oversight]) confirmed that the organization, as chartered, included managers from these project organizations. The inspectors noted that the ES&H organization was represented on the PMT by the Radiological, Nuclear, and Process Safety Manager (PMT Chair), the Safety Analysis Manager (Alternate Chair), and the Regulatory Safety Manager. The inspectors also noted that the Operations organization was represented on the PMT by the Commissioning and Training Manager, who was also responsible for plant maintenance. Finally, the inspectors noted that, in addition to the above managers, the PMT organization included the Deputy Engineering Manager for Mechanical, the Deputy Engineering Manager for Systems and Projects, and the ES&H Liaison Manager.

The inspectors reviewed position descriptions for the Contractor managers assigned to the PMT. The job descriptions described, in detail, the position responsibilities, specific duties, primary interface roles, and specific education and experience requirements. The job descriptions also contained the responsibilities related to the safety requirements and standards identification process.

Resumes of seven of eight PMT members were reviewed. The inspectors determined that the PMT members had significant, multi-discipline technical experience, with several members also having management experience. Each individual had over 20 years experience in the commercial nuclear power industry and/or DOE projects. Many of the individuals had advanced degrees in engineering. As a result of the review of resumes and interviews of some PMT members, the inspectors determined that the individuals had appropriate knowledge and experience in their assigned areas, and were in management positions responsible for facility design, safety, and operation.

1.2.3 Conclusions

Based on review of the position descriptions and resumes of Contractor managers assigned to the PMT, and review of the PMT Charter, the inspectors concluded that the SRD requirements related to process initiation were being met and PMT members had the appropriate technical backgrounds to perform their assigned tasks in support of establishing radiological, nuclear, and process safety standards and requirements for the design, construction, and operation of the facility.

1.3 Identification of Work (ITP-105)

The inspectors evaluated the Contractor's approach for identifying and documenting work to be performed such that hazards inherent in the work could be identified and evaluated. The Contractor's work identification activity was evaluated to determine if it was iterative, reconsidered as the facility design evolved, and based on the outcome of hazards evaluations and development of hazards control strategies.

1.3.1 Inspection Scope

The inspectors interviewed Contractor Engineering and ES&H personnel and reviewed management assessment reports, system descriptions, the Design Process Plan and Description (PL-W375-EG00001), procedures, design guides, reports, process flow diagrams (PFDs), design change documentation, and ISM meeting minutes to verify:

- Identification of work was performed by work activity experts who were integrally associated with the facility design, had extensive knowledge of the overall processing approach, and were knowledgeable of the processes that must be performed
- The process management team provided oversight of the ISM process, which included the work identification activities
- When required, functions, processes, and parameters were selected through the use of trade studies and definition of functional requirements
- The Contractor used an iterative process when performing work identification activities.

1.3.2 Observations and Assessments

Work activity experts, providing support to the ISM process, were drawn from the Engineering, ES&H, Operations, and other organizations, as appropriate. The inspectors did not review the specific training and qualifications of these work activity experts. Instead, the inspectors relied upon the results of the Training and Qualifications Inspection performed from May 14-18, 2001, and the continuing OSR oversight of the ISM process to assess the qualifications of work activity experts.

During the Training and Qualifications Inspection, the Contractor was evaluated for the Quality Assurance Program (QAP) commitment to (1) hire employees with proper educational background to fit established positions, (2) verify minimum education and experience, or when minimum education and experience could not be verified, provide documented justification for the personnel assignment, and (3) ensure that personnel selected to perform work would have the experience and ability to provide the necessary quality performance, as defined by the position description. The May inspection team concluded that the training and qualification program was implemented adequately and was effective in providing appropriately qualified and certified staff to accomplish the important-to-safety work described in the authorization basis.

The OSR's oversight of Contractor ISM activities (e.g., attend work identification meetings, hazards identification meetings, control strategy selection meetings, etc.), included observing performance of ISM participants. OSR oversight staff had observed that work activity experts included individuals that represented the disciplines appropriate for the work activity being evaluated. In addition, engineering experts demonstrated adequate knowledge of and involvement with the work activities and were able to provide meaningful input to the discussion and evaluation of hazards and hazardous situations associated with the work activity, potential preventive and mitigative control strategies to reduce the risks from these hazards/hazardous situations to acceptable levels, etc. The inspectors found the results of the Training and Qualifications Inspection coupled with the continuing OSR oversight of the Contractor's ISM activities were adequate to address this inspection item.

The inspectors reviewed Contractor documents to verify that the PMT was providing the proper oversight of the ISM process, including work identification activities. Specifically, the inspectors reviewed minutes from four PMT meetings held in May and June, 2001 (PMT Meeting Minutes Nos. 21 through 24). PMT oversight of the ISM process was a commitment in Appendix A, Section 2 of the SRD. The PMT meeting minutes provided objective evidence of PMT oversight of the Contractor's ISM process activities, including work identification, hazard evaluation, development of control strategies, and standards selection. The inspectors also reviewed Management Assessment Report 24590-WTP-MAR-ESH-01-005, "Management Assessment Report of the Interface between the PMT and the PSC." This report assessed the interface between the PMT and the Project Safety Committee (PSC) as it related to the standards selection and confirmation process. The assessment found the interface to be working in accordance with commitments in SRD Appendix A. Some minor weaknesses were identified and corrective actions were identified. The inspectors considered this assessment to represent a proactive attitude on the part of the Contractor, in that the adequacy of this interface was evaluated before the PSC became actively involved in the standards selection and confirmation process. The inspectors also reviewed the PMT charter contained in PMT Meeting Minutes CCN 021520. The PMT Charter was found to be consistent with the SRD, Appendix A commitment that the PMT provide the necessary guidance to the Contractor's ISM teams for implementing the ISM process.

The inspectors reviewed procedures and design documents and interviewed Contractor Engineering and ES&H personnel to verify that appropriate design inputs, such as regulatory requirements, design bases, performance requirements, and codes and standards were identified and documented, and that the selection was reviewed and approved by the responsible design organization. Procedure K70P557E, "Design Inputs," establishes the process to control design inputs. This procedure addressed requirements for identifying, selecting, controlling, and documenting design inputs for drawings and specifications. Design inputs were documented on a Design Input Memorandum (DIM). DIMs were required for both alpha and numeric revision drawings. According to the procedure, alpha revision drawings and specifications were not required to be aligned with the authorization basis. DIMs captured requirements from the Design Criteria Database, Standards Identification Process Database (SIPD), design guides, engineering studies, research and technology results, calculations, drawings, and design changes. Procedure K70P557E required that DIMs be prepared and reviewed by the document preparer and approved by the Deputy Engineering Manager or designee of the responsible engineering group. Design inputs, such as SIPD, owned by another organization were required to be formally transmitted from that organization to Engineering for entry into the appropriate DIMs.

Changes from specified design input, including the reasons for the changes, were required to be identified, approved, documented, and controlled.

The inspectors reviewed the following DIMs and/or drawings with DIMs attached:

- DIM-W375-00-00285, "Process Flow Diagram – Pretreatment Vessel Vent System PT-540/770," Rev. 2, dated October 17, 2000

- 24590-HLW-M5-V17T-00007002, "Process Flow Diagram - HLW Vitrification Liquid Waste System (System 510), Sheet 2," Rev. 0, dated August 15, 2001

- 24590-HLW-M51-V17T-00003, "Process Flow Diagram - HLW Vitrification Primary Offgas (System 231)," Rev. 0, dated August 15, 2001

- 24590-HLW-M51-V17T-00004, "Process Flow Diagram - HLW Vitrification Secondary Offgas (System 231)," Rev. 0, dated August 15, 2001

- 24590-HLW-M51-V17T-00005, "Process Flow Diagram - HLW Vitrification Pulse Ventilation Treatment (System 235)," Rev. A, dated August 15, 2001.

These DIMs were found to conform to the requirements of procedure K70O557E with one exception. The inspectors found that ES&H, the owner of the SIPD data base, did not formally transmit SIPD design requirements to Engineering for use, as required by procedure K70P557E. The inspectors interviewed a pretreatment process engineer, a safety analyst, and a low activity waste (LAW) hazard and safety analysis lead concerning how SIPD requirements were transmitted to Engineering. All stated that the cognizant safety engineer inputted SIPD requirements directly to the DIM table. The three Contractor staff interviewed stated that ES&H formally signed off on the SIPD requirements contained on the DIM as part of the Design Review Request (DRR) using form K70F507. Of the set of DIMS reviewed, the inspectors identified no instances where SIPD design requirements were not included on the DIM and signed off by the cognizant safety engineer. The inspectors considered the failure to follow procedures to be a Finding (IR-01-006-01-FIN).

The inspectors reviewed Contractor records from four past work identification meetings for information used in the ISM process. Meeting minutes reviewed by the inspectors included:

- Document No. 008127, "ISM Cycle 2 Kickoff Meeting for HLW Offgas System," dated November 11, 1999

- Draft meeting minutes, "Identification of Work Meeting for ‘100’ Systems," dated August 14, 2001

- Draft meeting minutes, "Work Identification for PTF HRP/HUP/LUP – Pretreatment Facility HLW Feed Receipt Process System, HLW Ultrafiltration Process System, and LAW Ultrafiltration Process System (PT Systems 210-230)," dated September 5, 2001

- Document No. 007753, "ISM Cycle 2 Kickoff Meeting for HLW Melter Support (Areas 210, 220, and 240)," dated October 22, 1999.

The ISM information evaluated during these meetings was found to involve design material considered appropriate for the type of hazard identification performed, including process flow diagrams, piping and instrumentation diagrams, view plans, layouts, mechanical handling drawings, system descriptions, and technical reports.

The inspectors evaluated Contractor procedures to verify that design methods, materials, parts, equipment, and processes essential to the function of SSCs were selected and reviewed for suitability and identified the following:

- Procedure K70P551E, "Drawings and Sketches: Preparation, Checking, and Approval," Rev. 2, dated August 2001, required all completed drawing be distributed and accompanied by a DRR (form K70F507). Instructions for completing the DRR were found in procedure K13P023, "Internal Review and Approval of Documents." Procedure K70P551E required the hazard and safety analysis lead to review the drawing and associated DIM for conformance with SIPD, fundamental aspects of design, and other analytical criteria. The originator was required to resolve all comments and ensure that the DRR was signed and dated by reviewers

- According to procedure K70P551E, the Deputy Engineering Manager or designee determined if design verification was required. Design verification was required for identified important-to-safety and immobilized high level waste (IHLW) product quality-affecting SSCs. Design verification was required to be performed in accordance with Procedure K70P555, "Design Verification"

- Procedure K70P551E required a designated checker (i.e., a person qualified to originate the drawing, but not involved in the preparation of the drawing) or verifier to check that the drawing conformed to design criteria and applicable codes, and was constructible, operable, and maintainable.

The inspectors found the above procedures acceptable. Completed DRRs and checking and verification of design output documents should be reviewed as part of the upcoming Design Process Inspection using inspection technical procedure (ITP) I-104, "Design Process Assessment."

The inspectors evaluated the Contractor's use of other information, such as reports or trade studies, in the work identification activity. System descriptions, design change authorizations (DCAs), and design change notices (DCNs) reviewed by the inspectors for this evaluation included:

- DCA-W375-99-0098, "Add Organic Adsorbers, C15002A and B, to Pretreatment Vessel Vent," Rev. 0, dated August 24, 1999

- DCA-24590-01-00003, "Pretreatment Building Design Evolution," Rev. 0, dated August 8, 2001

- DCN-24590-01-00023, "Increase SBS Condensate Collection Vessel Capacity," Rev. 0, dated July 19, 2001

- SD-W375PT-PR00011, "System Description for HLW Feed Receipt System PT-210," Rev. 3, dated October 3, 2000.

The inspectors found that trade studies, engineering studies, research and development work, and calculations were used as design inputs and were documented in DIMs. System descriptions, design change authorizations, and design change notices were found to include information from trade studies, engineering studies, research and development work, and calculations. No deficiencies were identified.

The inspectors evaluated whether the Contractor was re-performing the work identification activity as a result of design evolution. The inspectors found that the Contractor approved DCA-24590-01-00003, which, among other changes, combined the pretreatment and LAW pretreatment buildings. This change identified the need to re-perform ISM Cycles 1 and 2. The inspectors also found that, on August 30, 2001, the Contractor conducted a meeting to identify changes and available design material for the LAW vitrification facility finishing and handling systems. These systems were designed to inspect, weld, and decontaminate LAW containers filled with glass. Design media identified for use in subsequent hazard identification meetings included systems descriptions, mechanical flow diagrams, and mechanical handling diagrams. Thus, the inspectors found that reconsideration of work identification in light of design evolution had occurred in the pretreatment reconfiguration effort and LAW container handling design changes. No deficiencies were identified.

1.3.3 Conclusions

Based on past inspection activities and continued OSR oversight of the Contractor's ISM process, the inspectors concluded that work activity experts were qualified adequately to perform their assigned ISM responsibilities. From review of PMT meeting minutes and Contractor management assessment reports, the inspectors concluded the PMT performed oversight of the ISM process adequately. The inspectors found the Contractor controlled design inputs and properly considered trade studies, engineering studies, research and development work, and calculations for design inputs; however, a related failure to follow procedures was identified as a Finding. Finally, the inspectors concluded that the Contractor was using the appropriate design information in work identification meetings and was re-performing work identification, as necessary, as a result of design evolution.

1.4 Hazards Evaluation (ITP-105)

1.4.1 Inspection Scope

The inspectors interviewed Contractor engineering and ES&H personnel and reviewed design guides for the ISM process and radiological consequence analysis, project procedures, and preliminary accident analysis. These activities were intended to verify:

- The Contractor's hazards evaluation process included the following elements:

  - Identification of hazards
  - Identification of potential accident/event sequences
  - Estimation of accident consequences
  - Estimation of accident frequencies
  - Consideration of common-cause and common-mode failures
  - Definition of design basis events
  - Definition of operating environments
  - Identification of potential control strategies
  - Documentation.

- The methodologies and guidelines in the American Institute of Chemical Engineers (AIChE), "Guidelines for Hazard Evaluation Procedures, Section Edition with Worked Examples," were used to perform a structured and systematic examination of systems and components to identify potential accidents, including common-mode and common-cause failures

- The severity levels, estimated early in the design process and assigned to postulated radiological accidents to reflect the unmitigated consequences, conformed to the estimated radiological consequences provided in Section 4.3.1 of Appendix A to the SRD and were confirmed as the design progresses

- The Contractor's estimates for frequency of internal events were validated as the design progresses

- An initial set of potential hazards controls had been identified to manage each potential accident. These hazards controls addressed means for preventing and/or mitigating the consequences of the accident.

1.4.2 Observations and Assessments

The inspectors reviewed Design Guide K70DG528 that addressed the Contractor's ISM program. The design guide described the activities to be completed by the Contractor in the application of the ISM process for the RPP-WTP. The design guide provided a short, main body which contained a discussion of key features of the ISM process and several appendices. The appendices provided the details of how the information essential to ISM should be developed, including details on hazards techniques to be used (Appendix A), methodology for estimating the frequencies of potential initiating events and the number and type of engineered safety features needed to meet exposure standards and target frequencies (Appendix B), guidance on addressing common-cause and common-mode failures (Appendix C), methodology for reducing the set of control strategy development records into a smaller set of design basis events (DBEs) (Appendix D), methodology for demonstrating RPP-WTP compliance with risk goals (Appendix E), and a set of diagrams that depicted the ISM process in graphical form (Appendix F). Based on the review of the design guide, the inspectors reached the following conclusions:

- Sections 4.1 and 4.2 and Appendix A of the design guide provided adequate guidance for the identification of hazards

- Section 4.2 of the design guide provided adequate guidance for the identification of potential accident/event sequences

- Section 4.2 of the design guide, supplemented by the guidance in design guide K70DG715, "Radiological Consequence Analysis," provided adequate guidance for estimating accident consequences

- Appendix B of the design guide provided adequate guidance for the estimation of accident frequencies

- Sections 3.1.5 and 4.5.2, Appendices A and C, and Table A7 of the design guide provided adequate guidance for the consideration of common-cause and common-mode failures in the hazards evaluation process

- Section 4.5 and Appendix D of the design guide provided adequate guidance for selecting and documenting design basis events

- Section 4.5.2 of the design guide adequately addressed the need to determine operating environments when performing accident analysis

- Section 4.3 of the design guide provided adequate guidance for the identification of potential control strategies

- Section 4.6 of the design guide provided adequate guidance for documentation of the output from the ISM process.

In addition to review of Design Guide K70DG528, the inspectors reviewed Safety Information Notices (SINs) SIN-W375-00-00047 and SIN-W375-99-00080 and the preliminary DBE and standards selection output in SIPD for evidence of an adequate hazards identification process. SIN-W375-00-00047 documented the hazards evaluation process for HLW System 100 (HLW Vitrification Melter Feed) for Cycle 2 of the ISM process. SIN-W375-99-00080 documented the meeting minutes from two previous ISM Cycle 2 Hazards and Operability (HAZOP) meetings on the same system. From review of the SINs, the inspectors concluded that the hazards evaluation process had adequately considered the hazards evaluation process elements discussed in the bulleted items above. From the review of SIPD information, the inspectors concluded that the database contained adequate information on the results of the hazards evaluation process, including the identification of hazards and potential accident/event sequences, estimates of unmitigated accident consequences and frequencies, and identification of potential control strategies (e.g., control strategy elements and safety case requirements). No deficiencies were identified.

The inspectors reviewed procedure K70P568B, "Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards," to assess the adequacy of the requirements for defining the process for the selection and tailoring of radiological, nuclear, and process safety

requirements and standards for the design, construction, and operation of the RPP-WTP. The inspectors concluded that the procedure specified requirements consistent with the guidance provided in Contractor Design Guide K70DG528 and that ISM-process implementation documents (e.g., SIPD entries, SINs) were in compliance with the procedure.

The inspectors compared the instructions provided in Design Guide K70DG528 with the guidance provided in the "Guidelines for Hazard Evaluation Procedures, Second Edition with Worked Examples," American Institute of Chemical Engineers (AIChE), Center for Chemical Process Safety, 1992. The methodologies (e.g., What-If and HAZOP hazards evaluation techniques) and guidelines provided in Design Guide K70DG528 were consistent with the AIChE Guidelines and were adequate to perform structured and systematic evaluations of SSCs. The methodologies provided in Design Guide K70DG528 included instructions for identifying potential accidents, including the consideration of common-cause and common-mode failures. No deficiencies were identified.

The inspectors reviewed preliminary Calculation No. 24590-HLW-04C-078T-00001, "Design Basis Event Analysis for the Bounding Process Vessel Waste Spill in the HLW Vitrification Facility," for the purpose of verifying that severity levels assigned based on the unmitigated consequences from hazards analysis are validated as the design progressed. Based on review of the preliminary calculation and Procedure K70P505, "Accident Analysis," the inspectors concluded that:

- Sections 5.1.3 and 5.3.3 and Appendix A of the preliminary calculation addressed requirements for determining the inventory of material at risk

- Sections 5.1.3 and 5.1.4 of the preliminary calculation addressed requirements for determining the respirable release fraction to be used in the accident analysis

- Sections 5.1.4 and 5.3.3 of the preliminary calculation addressed requirements for determining the fraction of the airborne material released to potentially occupied locations

- Section 5.1.4 of the preliminary calculation addressed requirements for determining the bounding atmospheric dispersion coefficients

- Appendix A of the preliminary calculation addressed requirements for determining the radiological composition of the material released during the analyzed accident

- Appendix C of the preliminary calculation addressed requirements for determining the external radiation field

- Key Assumptions 4, 5, and 13 and Section 5.1.1 (with reference to K70P505, "Accident Analysis") of the preliminary calculation addressed requirements for determining exposure times.

Thus, the inspectors concluded that, while the calculation reviewed was preliminary and no other calculations were available for review, the Contractor's accident analysis effort was comprehensive and addressed the necessary considerations in determining both the unmitigated

and mitigated consequences for the HLW vessel waste spill event. The SIPD entry for this event (CSD Record No. CSD-H100/N0016) was reviewed and found to indicate that, for the unmitigated event analysis, the consequences to the facility worker and co-located worker were SL-1 (Severity Level 1) and SL-3 to the public. The unmitigated accident analysis dose consequences were calculated (Calculation No. 24590-HLW-04C-078T-00001) to be 5500 rem (SL-1) to the worker, 290 rem (SL-1) to the co-located worker, and 0.54 rem (SL-3) to the public. Thus, the severity levels determined by the hazards analysis validated the preliminary accident analysis. The Contractor stated that it currently had underway a source term recovery effort. Part of this recovery effort included plans to further validate the severity levels determined from the hazards analysis. The inspectors concluded that the Contractor had adequate plans and procedures in place to validate the hazards analysis severity levels and that preliminary accident analysis results were acceptable. No deficiencies were identified in this area.

As noted above, the Contractor's accident analysis effort had not progressed to the point that final, approved calculations were available for review. Because of this, the inspectors could not verify that the Contractor's estimates for the frequency of internal events were being validated as the design progressed. The Contractor stated that they would be developing event trees during the DBE analyses. These event trees would be used to confirm the frequency analysis performed during the hazards analysis portion of the ISM process. The Hazards Analysis Reports submitted with the Preliminary Safety Analysis Reports for the HLW, LAW, and Pretreatment (PT) facilities should contain the results from the event trees developed during the DBE analyses for OSR review. Recognizing that the lack of completed, final, and approved accident analysis calculations precluded a complete review, no deficiencies were identified in this area.

As noted above, the SIPD entry for the HLW vessel waste spill event (CSD Record No. CSD-H100/N0016) was reviewed during this inspection. From that review, the inspectors concluded that the Contractor was in the process of identifying the potential hazard controls to manage each potential accident. Specifically, for the HLW vessel waste spill event, SIPD identified control strategy elements and safety case requirements (safety functions), which included:

- Secondary confinement of the spilled waste provided by the Wet Process Cell boundary
- Level detection and steam ejector capability in the Wet Process Cell to detect a spill and transfer the spilled material to the Wash Effluent Breakpot
- Fabrication of the HLW vessels (V31001 and V31002) from materials of construction designed to operate for a 40-year lifetime
- Secondary confinement of entrained aerosols (including filtration of airborne radionuclides) associated with the spilled waste provided by the C5 ventilation system.

These safety case requirements were identified as providing either an important-to-safety or defense-in-depth function. Thus, the inspectors concluded that the output of the hazards analysis process, namely the SIPD entries, included adequate identification of the set of potential hazards controls and their safety functions associated with potential facility accidents. No deficiencies were identified in this area.

1.4.3 Conclusions

Based on review of project procedures and design guides for the ISM process and radiological consequence analysis, review of preliminary accident analysis, and interviews of project EH&S and Engineering personnel, the inspectors concluded that the Contractor's hazards evaluation program implementation was adequate.

1.5 Development of Control Strategies (ITP-105)

The process for development of control strategies was identified in SRD Appendix A, "Implementing Standard for Safety Standards and Requirements Identification." The Contractor's Design Guide K70DG528, "Integrated Safety Management," provided more detailed guidance on implementing this standard. The design guide required the following: (1) control strategies developed as an integral part of the standards and requirements identification process, (2) potential control strategies considered that were able to prevent and/or mitigate the hazardous situations, (3) a process for identifying the preferred control strategies intended to be iterative in the same manner as the rest of the standards identification process, (4) as more design detail is developed, better definition for the selection of preferred control strategies, (5) documentation of the rationale for the selected control strategies over other potential control strategies, (which could be a brief description of the rationale for not selecting other potential control strategies), and (6) review and confirmation of selected control strategies in control strategy confirmation meetings.

1.5.1 Inspection Scope

At the time of this inspection, the Contractor had not completed identification of the final set of DBEs and associated control strategies. The inspectors reviewed the Contractor's implementation of the ISM process for development of control strategies, including the documentation of ISM results. The inspectors also reviewed many control strategy development (CSD) records in the SIPD database using a Contractor computer terminal. A small sample of natural phenomenon hazard (NPH) DBEs and associated control strategies and implementation of defense-in-depth were reviewed.

1.5.2 Observations and Assessments

In the limited set of CSD records in the SIPD database reviewed by the inspectors, control strategies, defense in depth, control strategy functions and performance requirements, estimates of unmitigated event frequency, and estimates of consequences from unmitigated events were appropriately identified. The Contractor stated that the DBE identification and final preferred control strategy selection work had not been completed and was not reflected in the database. Based on review of the CSD records in the SIPD database, the inspectors concluded:

- Sufficient control strategy elements linked to hazardous situations had been identified to potentially meet the defense in depth requirements for DBEs. However, final selection of DBEs and associated control strategies had not been completed at the time of inspection

- Assignment of Severity Levels was consistent with the SRD commitments

- Control strategy elements were appropriately linked to the identified hazardous situations and initiating events.

SRD, Appendix A, Section 5.0, "Development of Control Strategies," required the following information produced by the control strategy definition process to be recorded in the Contractor's hazard database (i.e., SIPD):

- Rationale for preferred control strategy selection
- Estimate of the consequences (i.e., dose values) from the mitigated event
- Estimate of the mitigated event frequency.

However, based on the review of the sample of SIPD CSD records, the inspectors did not find this information documented in the hazard database. In addition, no database field was found into which such information could be entered. While it was recognized that the Contractor had not completed the process for DBE selection and selection of preferred control strategies for DBE mitigation, these examples of non-compliance with SRD, Appendix A commitments were considered a Finding (IR-01-006-02-FIN).

A sample of calculations was reviewed by the inspectors. The inspectors determined that the calculations took account of the material at risk (MAR), airborne release fraction (ARF), radiological composition, external radiation field, exposure times, etc. No deficiencies were identified.

The inspectors reviewed the Contractor's selected control strategies for a sample of natural phenomenon hazards, as follows:

Ash-fall Event

The SRD includes an ash-fall event as a natural phenomenon hazard that is required to be considered in the design of safety systems. The inspectors reviewed DBEs by accident type for the HLW ventilation systems to determine if these systems had been designed for operation at design airflow rates after an ash-fall event. The area ventilation systems consisted primarily of inlet supply air fans, ductwork, and exhaust air fans. The exhaust air fans were designed to maintain negative pressure in the buildings relative to the outside atmosphere and to direct airflow from clean areas to potentially contaminated areas. The supply air provided the required heat removal for indoor temperature control and was necessary for the establishment of the design pressure gradients within the building which ensured the flow of air from areas of least contamination potential (C2 area) toward areas of greatest contamination potential (C5 area).

The DBEs were reviewed for information related to ash-fall events as to the effects, if any, on ventilation systems. In particular, hazardous situation ID number CSD-H700/N0049, which postulated that blocked intake filters due to volcanic ash or sandstorm could result in "…degradation/loss of C2 supply airflow resulting in rupture of ducting and potential spread of contamination from C2 to C3," was reviewed and discussed with the HVAC Engineering Manager. The inspectors were informed that, based on analysis performed to date, the Contractor does not expect this ductwork to collapse during the ash-fall event. The Contractor

told the inspectors, it planned to have operating procedures in place to require reduction in the speed of the exhaust fans in response to an ash-fall event. The reduced speed operation would maintain negative pressure in the areas served by the ventilation system, while providing additional protection of the ductwork against the potential for increased negative pressures caused by the degradation of the supply air due to the ash-fall event. No deficiencies were identified.

Tornado

SRD Table 4.1, "Natural Phenomena Design Loads for Important to Safety SSC's with NPH Safety Functions," stated that hazards resulting from tornado and tornado missiles were not applicable. Consistent with SRD Table 4.1, the inspectors noted in the review of the HLW ventilation systems, as discussed above, that there were no provisions in the design for protection of equipment from tornado-induced differential pressure loads. The inspectors found the determination not to design for tornado loads acceptable.

The inspectors reviewed the design of the C5 exhaust ventilation system design to determine if the system was designed to operate after a single failure. The following attributes were reviewed:

- Loss of power: Normal power consisted of two separate off-site power sources. Upon a loss of off-site power, important-to-safety systems would be powered by the emergency diesel generator system. The inspectors considered this design acceptable.

- Fan system: The C5 exhaust ventilation system design included two 100 % capacity exhaust fans. Either fan was capable of performing the exhaust function. The standby unit would automatically start upon the failure of the operating fan. Each C5 exhaust fan was interlocked with its corresponding discharge damper such that the damper opened/closed upon fan start/stop. In the event the fan discharge damper did not fully open on receipt of a fan "start" signal, a fan failure alarm would be generated, and the standby unit would be started. The inspectors determined that, at the time of the inspection, the C5 system design satisfied the single failure criteria.

1.5.3 Conclusions

The inspectors concluded that the Contractor's process for development of control strategies was generally consistent with the commitments in Appendices A and B of the SRD. A Finding was identified because the Contractor's hazard database did not comply with the SRD, Appendix A commitment to include information produced by the control strategy definition process.

Based on the review of control strategies for a sample of the NPH events, the inspectors concluded that the Contractor's ISM process implemented the SRD implementing standard for defense-in-depth and single failure criteria.

1.6 Identification of Standards (ITP-105)

SRD Appendix A required the identification of standards to be an iterative activity, dependent on the maturity of the information resulting from the previously discussed steps in the standard selection process (i.e., identification of work, hazard evaluation, and selection of preferred control strategies). The intent of the standards identification process was to identify a set of design standards for important-to-safety SSCs needed to prevent or mitigate consequences of DBEs. At the time of the inspection, the design had not progressed to the point where the implementation of the complete standards identification process could be fully evaluated. However, the standards identification process and associated Contractor procedures were evaluated.

1.6.1 Inspection Scope

The inspectors interviewed Contractor Engineering and ES&H personnel and reviewed project procedures, design guides, design change documentation, and the output from the ISM process as documented in the SIPD database. These activities were intended to verify that (1) the standards selection process was iterative, (2) the implementation of the standards selected was tailored to better fit the hazards as the design evolved, and (3) the linkage from the hazards analyzed, through the control strategies selected, to the standards identified was properly documented.

1.6.2 Observations and Assessments

The Contractor identified Design Guide K70DG528, "Integrated Safety Management," as the appropriate document to be utilized for the identification of standards. Specifically, requirements for standards identification were contained in design guide Section 4.5, "Design Basis Events (DBEs) and Standards Identification." Standards should be selected to support the performance requirements identified for each important-to-safety SSC which comprised a control strategy for a DBE.

The standards identification process was intended to be iterative. As more DBEs were identified, standards should be identified that supported the required control strategies. The iterative nature of the standard selection process was supported by the standard identification flow chart (Figure F11 in Appendix F of the ISM design guide). The flow chart, as well as the design guide, provided guidance consistent with the iterative nature of the ISM process, in general, and with the standards identification process, in particular. A stated objective of the continuing ISM activity was to identify the design standards for important-to-safety SSCs needed to prevent or mitigate consequences of identified DBEs.

The inspectors reviewed the information contained in SIPD for the LAW C3/C5 drain/sump collection vessel (V25002) and HLW offgas submerged bed scrubber (SBS) condensate vessel (V32101). The intent of this review was for the inspectors to determine if control strategy elements were sufficiently described to support standard identification. The inspectors were satisfied that the necessary information was captured within SIPD to allow for the identification of proper design standards.

The inspectors reviewed a listing of approved DCAs and DCNs. There were three DCAs and twelve DCNs approved to date. One DCA and two DCNs, including supporting drawings and calculations, were selected from the listing for detailed review. The inspectors found that the design change documentation was thorough and the associated calculations and drawings contained sufficient detail to support the conclusions and proposed changes. No items were reviewed for which a standards change was considered necessary.

1.6.3 Conclusions

Based on the review of the Contractor's ISM process and ISM output information and discussions with Contractor Engineering and ES&H personnel, the inspectors concluded that the standards selection process was iterative. The inspectors found that processes and procedures were in place to provide the methods to properly select the design standards for the important-to-safety SSCs needed to prevent or mitigate the consequences of identified DBEs. In addition, the inspectors verified that the required linkages existed between the hazards analyzed, control strategies selected, and standards identified. As the design evolved, standards were selected appropriately to implement identified control strategies.

1.7 Confirmation of Standards (ITP-105)

The design had not matured to the point where the standards set for any SSC designs had been reviewed by the Contractor PSC. Therefore, it was not possible to verify that the confirmation of standards was based on a defined and documented approach (SRD, Appendix A, Section 8.0). The inspectors were also not able to verify that the confirmation of standards was appropriately documented and that comments from the PSC were formally dispositioned by the PMT (SRD, Appendix A, Sections 7.0 and 8.0).

1.7.1 Inspection Scope

As stated above, only the process for confirmation of standards could be reviewed due to the lack of project design output documentation and associated final, tailored standards. Contractor Design Guide K70DG528, "Integrated Safety Management," was the basis for this review and was compared to the SRD Appendix A requirements.

1.7.2 Observations and Assessments

Appendix A of the SRD, Section 8.0, "Confirmation of Standards," stated that, based on the recommendations of the PMT, the PSC Chair requested the PSC to confirm the selected set of standards. The PSC was to define a review approach, carry out the review, and document the findings of the review. PSC comments were to receive formal disposition by the PMT.

Contractor Procedure K70P568B, "Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards," was reviewed by the inspectors and found to include requirements consist with the SRD. Specifically, Section 3.10, "Confirmation of Standards," of

the procedure stated that, based on the recommendations of the PMT, the Project Manager requested the PSC to confirm the selected set of standards coming out of the ISM process. The PSC was required to define a review approach, perform the review, and document the findings of the review. Comments from the PSC review were required to be formally dispositioned by the PMT. Finally, the procedure required the recommended set of standards be certified in accordance with project implementing documents. The inspectors did not review these implementing documents. When properly implemented, the intent of the Contractor, as identified in the procedure was that the set of confirmed standards (1) provide adequate safety, (2) provide uniform application of the standards over the complete project, (3) comply with applicable laws and regulations, and (4) conform to the top-level safety standards and principles.

1.7.3 Conclusions

Although the lack of completion of the ISM process (i.e., standards identification had not progressed to the confirmation stage in any area of the facility design) limited the inspection scope, the inspectors concluded the Contractor had procedures in place which should ensure that the standards confirmation process was performed in accordance with SRD commitments.

1.8 Formal Documentation (ITP-105)

As previously discussed, the Contractor had not completed the selection of standards process for any SSC. Therefore, verification that the results of the selection process were being properly documented in the SRD and that the SRD identified and justified the set of requirements and standards selected to provide adequate protection for workers, the public, and the environment could not be performed during this inspection.

1.9 Recommendations (ITP-105)

As previously discussed the Contractor had not completed the selection of standards process for any SSC. Therefore, verification of Contractor certification that the recommended set of standards, when properly implemented, provided adequate safety, complied with applicable laws and regulations, and conformed with DOE/RL-96-0006 could not be completed during this inspection.

2.0 EXIT MEETING SUMMARY

The inspectors presented the inspection results to members of Contractor management at exit meetings on September 13, 2001, and November 2, 2001. The Contractor acknowledged the observations and conclusions presented. The inspectors asked the Contractor whether any materials examined during the inspection should be considered limited rights data. The Contractor stated that no limited rights data was examined during the inspection.

3.0 REPORT BACKGROUND INFORMATION

3.1 Partial List of Persons Contacted

Richard Garrett, Safety Analysis Manager
Pete Lowry, HLW Hazards and Safety Analysis Lead
Maurice Higuera, Pretreatment Hazards and Safety Analysis Lead
John Hinckley, LAW Hazards and Safety Analysis Lead
E. Smith, Safety Program Engineer
Garth Duncan, Deputy Engineering Manager
Mark Platt, Safety Program Lead
J. Christiansen, Safety Analyst
M. Boh, Pretreatment Process Engineer
Jan Sanders, Design Engineering
Bill Spezialetti, Regulatory Safety Manager
Dennis Klein, Radiological, Nuclear, and Process Safety Manager
Fred Marsh, Engineering Manager
Steve Lynch, Engineering Technology Manager
M. J. Jewell, Deputy Procurement and Property Manager
Fred Beranek, Environmental, Safety, and Health Manager

3.2 List of Inspection Procedures Used

Inspection Technical Procedure I-105, "Standards Selection Process Assessment"

3.3 List of Items Opened, Closed, and Discussed

3.3.1 Opened

IR-01-006-01-FIN	Finding	The Contractor was not following the requirements of procedure K70P557E for formally transmitting SIPD design requirements from ES&H to Engineering.
IR-01-006-02-FIN	Finding	The Contractor's hazard database (i.e., SIPD) did not contain control strategy information required by SRD Appendix A.

3.3.2 Closed

None

3.3.3 Discussed

None

3.4 Key Documents Reviewed

Procedures/Design Guides/Guides

- K13P023, "Internal Review and Approval of Documents," Rev. 0, dated January 31, 2001.
- K70P505, "Accident Analysis," Rev. 1, dated February 5, 2001.
- K70P526, "Project Safety Committee," Rev. 2, dated January 31, 2001.
- K70P551E, "Drawings and Sketches: Preparation, Checking, and Approval," Rev. 2, dated August 2001.
- K70P555, "Design Verification," Rev. 1, dated February 12, 2001.
- K70P557E, "Design Inputs," Rev. 2, dated August 24, 2001.
- K70P565C, "Design Criteria Database," Rev. 0, dated May 10, 2001.
- K70P568B, "Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards," Rev. 0, dated June 25, 2001.
- K70DG528, "Design Guide: Integrated Safety Management," Rev. 2, dated May 21, 2001.
- K70DG715, "Radiological Consequence Analysis," Rev. 0, dated May 8, 2001.
- K70G505A, "Environmental, Safety, and Health Review of Documents," Rev. 0, dated May 11, 2001.

System Descriptions

- SD-W375PT-PR00011, "System Description for HLW Feed Receipt System PT-210," Rev. 3, dated October 3, 2000.
- SD-W375LV-HV00002, "System Description - Systems 720, 721 and 725, LAW C2 Area Ventilation," Rev. C, dated October 17, 2000.
- SD-W375LV-HV00005, "System Description - System 750, LAW C5 Area Ventilation," Rev. C, dated October 17, 2000.

Drawings/Design Input Memoranda/Calculations

- 24590-HLW-M5-V17T-00007002, "Process Flow Diagram - HLW Vitrification Liquid Waste System (System 510), Sheet 2," Rev. 0, dated August 15, 2001.
- 24590-HLW-M51-V17T-00003, "Process Flow Diagram - HLW Vitrification Primary Offgas (System 231)," Rev. 0, dated August 15, 2001.
- 24590-HLW-M51-V17T-00004, "Process Flow Diagram - HLW Vitrification Secondary Offgas (System 231)," Rev. 0, dated August 15, 2001.
- 24590-HLW-M51-V17T-00005, "Process Flow Diagram - HLW Vitrification Pulse Ventilation Treatment (System 235)," Rev. A, dated August 15, 2001.
- DWG-W375PT-PR00014, "Process Flow Diagram – Pretreatment Vessel Vent System (PT-540/770)," Rev. 2, dated October 20, 2000.
- DIM-W375-00-00285, "Process Flow Diagram – Pretreatment Vessel Vent System (PT-540/770)," Rev. 2, dated October 17, 2000.
- Calculation No. 24590-HLW-04C-078T-00001 (Preliminary), "Design Basis Event Analysis for the Bounding Process Vessel Waste Spill in the HLW Vitrification Facility," undated.
- CALC-W375HV-NS00001, "Hydrogen Generation in HLW Receiving Tank Test Case," undated.
- CALC-W375HV-NS00005, "Severity Levels for LAW and HLW Melter Loss of Ventilation," undated.
- CALC-W375HV-NS00015, "Severity Levels for HLW Drops from Various Heights," undated.

Design Change Documentation

- DCA-W375-99-0098, "Add Organic Adsorbers, C15002A&B, to Pretreatment Vessel Vent," Rev. 0, dated August 24, 1999.
- DCA-24590-01-00003, "Pretreatment Building Design Evolution," Rev. 0, dated August 8, 2001.
- Design Change Note, DCN-W375-01-00014, Rev. 0, dated July 26, 2001.
- Design Change Note, DCN-W24590-01-00019, Rev. 0, dated July 18, 2001.
- DCN-24590-01-00023, "Increase SBS Condensate Collection Vessel Capacity," Rev. 0, dated July 19, 2001.

Meeting Minutes

- Meeting minutes, PMT meetings numbered 21 through 24, dated May 8, 2001, June 1, 2001, June 15, 2001, and June 25, 2001.

- Document # 007753, "ISM Cycle 2 Kickoff Meeting for HLW Melter Support (Areas 210, 220, and 240)," dated October 22, 1999.

- Document # 008127, "ISM Cycle 2 Kickoff Meeting for HLW Offgas System," dated November 11, 1999.

- Draft meeting minutes, "Identification of Work Meeting for '100' Systems," dated August 14, 2001.

- Draft meeting minutes, "Work Identification for PTF HRP/HUP/LUP – Pretreatment Facility HLW Feed Receipt Process System, HLW Ultrafiltration Process System, and LAW Ultrafiltration Process System (PT Systems 210-230)," dated September 5, 2001.

Management Assessments

- 24590-WTP-MAR-ESH-01-001, "Management Assessment Report for ES&H," Rev. 0, dated June 29, 2001.

- 24590-WTP-MAR-ESH-01-004, "Management Assessment Report for ES&H, Selection and Qualification of ISM Team Members," Rev. 0, dated September 6, 2001.

- 24590-WTP-MAR-ESH-01-005, "Management Assessment Report of the Interface between the PMT and the PSC," Rev. 0, dated September 10, 2001.

Other

- Position Descriptions and Resumes of PMT Members.

- PL-W375-EG00001, "Design Process Plan and Description," Rev. 1, dated February 14, 2001.

- 24590-WTP-RPT-TE-01-002, Rev. 0, "Design Basis Event Selection for the High Level Waste Vitrification Facility for the Preliminary Safety Analysis Report," dated August 31, 2001.

- SIN-W375-01-000100, "Documentation of ISM Cycle II Activities for HLW System 100," undated.

- SIN-W375-00-00047, "ISM Cycle 2 Study of HV Melter Feed System 100," Rev. 0, dated July 14, 2000.

- SIN-W375-99-00080, "ISM Cycle 2 HLW Melter Feed System Hazards Identification, HazOp Meeting Minutes," Rev. 0, dated December 2, 1999 and December 7, 1999.

3.5 List of Acronyms

AB	authorization basis
ABAR	Authorization Basis Amendment Request
ABCN	Authorization Basis Change Notice
AIChE	American Institute of Chemical Engineers
ALARA	as low as reasonably achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
ARF	Airborne Release Fraction
BNI	Bechtel National, Inc.
BOD	Basis of Design document
BOF	balance of facility
CAR	Construction Authorization Request
CSD	Control Strategy Development
DBE	Design Basis Event
DCA	Design Change Authorization
DCD	Design Criteria Database
DCN	Design Change Notice
DIM	Design Input Memorandum
DOE	U. S. Department of Energy
DRR	Design Review Request
ES&H	Environmental, Safety and Health
FMEA	Failure Modes Effects Analysis
HAR	Hazards Analysis Report
HAZOP	Hazards and Operability
HLW	High Level Waste
HRP	High-Level Waste Feed Receipt Process System
HUP	High-Level Waste Ultrafiltration Process System
ICD	Interface Control Document
IHLW	Immobilized High Level Waste
IEEE	Institute of Electrical and Electronic Engineers, Inc.
ITP	Inspection Technical Procedure
ISM	Integrated Safety Management
ISMP	Integrated Safety Management Plan
ITP	Inspection Technical Procedure
LAW	Low Activity Waste
LUP	Low-Activity Waste Ultrafiltration Process System
MAR	Material at Risk
NPH	Natural Phenomena Hazard
OAR	Operating Authorization Request
ORP	Office of River Protection
OSR	Office of Safety Regulation
PDC	Project Document Control

PMT	Process Management Team
PCAR	Partial Construction Authorization Request
PSAR	Preliminary Safety Analysis Report
PSC	Project Safety Committee
PT	Pretreatment
PTF	Pretreatment Facility
QA	quality assurance
QAP	Quality Assurance Program
QAM	Quality Assurance Manual
QL	Quality Level
RL	Richland Operations Office
RPP-WTP	River Protection Project Waste Treatment Plant
SBS	Submerged Bed Scrubber
SCR	Safety Case Requirement
SIPD	Standards Identification Process Database
SL	Severity Level
SRD	Safety Requirements Document
SSCs	structures, systems, and components

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